# Memorandum

To: Lauren Kemp

Construction Liaison
District 11 Environmental

Date: September 13, 2007

File: 11-SD-905-9.2/18.0 EA 11-274801

From:

DEPARTMENT OF TRANSPORTATION DIVISION OF ENGINEERING SERVICES

**Geotechnical Services** 

Office of Geotechnical Design - South

Subject: Proposed Slurry Basins at 905 and Caliente Avenue

### Introduction

Pursuant to your request an investigation has been conducted of the proposed slurry basin site as shown on the attached slurry plan sheet. The basins are intended to temporarily store the slurry produced from the grinding of concrete pavement. The investigation included site reconnaissance, review of the project Geotechnical Design Report (GDR) to construct the SR-905 Freeway and other archived documents, four shallow soil borings by hand auger, and percolation testing. This report is intended to convey information relevant to the design of the proposed slurry basins. Additional pertinent data concerning the slurry basin site can be found in the SR-905 Freeway GDR.

## **Site Description**

In it's current condition the proposed slurry basin site is fallow farmland that gently slopes a few meters in elevation from northwest to southeast. The site is bounded on the north by existing SR-905 and on the south by broad topographic swale.

## **Exploration and Testing**

Numerous soil borings and extensive geologic mapping was previously completed along the SR-905 alignment during preparation of the project GDR. Four of those borings (BB4, BB5, BB6, and BB7) were located relatively close to the proposed slurry basin site and may be considered representative of the subsurface conditions underlying the proposed basins. Copies of the field boring logs are attached to this report. The locations of borings BB5 and BB6 are depicted on the attached plan sheet.

Four shallow hand auger borings (PT1 through PT4) were conducted specifically for this investigation. The location of each boring is shown on the attached slurry basin plan sheet. The

Proposed Slurry Basins at 905 and Caliente Avenue 09/13/2007 Page 2

depth of the shallow borings was 1.6 meters. The depth of each boring was selected to approximate the depth of basin grading.

Percolation testing was conducted in the four shallow hand auger borings in accordance with CTM 750. The results of the percolation test are attached to this report. The following percolation rates were recorded:

PT1 63.1 min/in

PT2 12.4

PT3 30.2

PT4 40.3

Soil gradation testing was not performed, as the site soils are formational sandstone, siltstone, and claystone.

## **Site Geology**

The soil borings and geologic mapping clearly detail the subsurface conditions. A surficial layer of slightly organic clayey silt topsoil mantles the proposed slurry basin site. Soft/weak siltstone and fine grain sandstone of the Otay Formation underlie the topsoil. This flat lying sedimentary formation contains interbedded claystone and slightly indurated layers of somewhat harder formation.

#### Groundwater

No groundwater was encountered in the shallow hand auger borings conducted within the proposed slurry basin site. No Groundwter was encountered in any of the nearby borings conducted for the 905 project GDR and drilled to maximum depths of about 8.2 meters. The Department of Water Resources Bulletin 106-2 describes the general occurrence of groundwater in the area as being at depths greater than 100 feet. This generalization was confirmed by relatively deep borings conducted for bridge foundation exploration on the SR-905 project.

#### Recommendations

The site is well suited to accommodate the proposed slurry basins without the need for an impermeable basin liner. The site soils are easily rippable by heavy grading equipment. Soil percolation rates are relatively low. The prevailing geologic formation does not readily store or convey subsurface water. There are no aquifers in the project area. The proposed basins will not leach slurry into groundwater resources. Due to the hydrogeologic behavior of the surrounding sedimentary formation, an average percolation rate of roughly 44 min/in will govern basin behavior. However, the precipitation of slurry cake will quickly render the basin floor essentially impermeable.

The graded soil berms that form the sides of the proposed slurry basins will be significantly more permeable than the undisturbed native formation. To minimize seepage, the

Proposed Slurry Basins at 905 and Caliente Avenue 09/13/2007 Page 3

soil berms should be placed to a relative compaction of 90% with a minimum top width of 3 meters and a side slope gradient of 1:2 (vertical to horizontal). Mild water seepage through the berms should be anticipated, however, such seepage is not necessarily problematic. Berm seepage rates may be insufficient to produce surface flow, and any concentrated seepage may be effectively managed. The basin side of the berms may be lined to reduce the seepage rate. If utilized, the impermeable liner should extend a minimum of two meters onto the floor of the basins. For optimum results seams in the lining should be minimized. Lining of the basin floors may be considered superfluous since the precipitation of slurry cake will quickly render the basin floor essentially impermeable.

The width and relative compaction of the graded soil berms may be substantially reduced if the slurry basins are constructed with a competent impermeable liner. In addition to the design of basin liners, responsible staff outside OGDS should provide the design of minimally dimensioned and compacted earth berms.

OGDS staff is available to provide further site information and recommendations. If you have additional questions or require clarification please contact Brian Hinman at (office) 858 467-4051 or (mobile) 858 705-1344.

Brian Hinman

Senior Transportation Engineer

Office of Geotechnical Design - South

Buar Hinman

cc: Abbas Abghari OGDS2 Files

Attachments

# PERCOLATION TEST

**GEOTECHNICAL DESIGN SOUTH-2** 

PROJECT			SITE LAYOUT/NOTES
EA#			
DATE	9/7/07		SR-905 -> EAST
TEST MADE BY	£CG		
AMBIENT TEMP		N ID	
WEATHER COND'N	SUNNY	1 2	_ x x x x x x x
SOAKING PERIOD	24 hrs	$ \omega $	*
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			PT2 OPTU

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HOLE DIA. (in)	6"	le 11	6"	6"				
READING	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
8" - 7"	12'10"	2'25"	6'25"	8/3/"				
8" - 7"	15'13"	3'24"	7 33"	11'36"				
8" - 7"	18'09"	3/9/"	8/28"	13/20/1				
8" - 7"	18'51"	3'45"	9'08"	13/0111				
8" - 7"	19112"	3'59"	9' 35"	12'02"				
8" - 7"	19'25"	2/5/"	9/3811	12'35"				
	20'19"							
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P =	63.1	12.4	30,2	40.3				

AVE. OF LOW RATES; PAVE - 44 min/in CALCULATION:

n =

0.3

## 1) Correction Factor ©

$$C = n[1 - (O/D)^2] + (I/D)^2 = 0.536111$$

Porosity of the pea gravel,

Inside diameter of perforated pipe in inches, | = 4

Outside diameter of perforated pipe in inches, 0 =

Actual diameter of percolation test hole in inches, D =

# 2) Conversion factor (K)

K = 0.27 + 8.7/D

K = 1.72



# 3) Equivalent Unlined 12-inch Diameter Percolation Rate (P)

P = K.R/C

P = \_\_\_\_ min/in

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State of California - Department of Transportation - Office of Geotechnical Services SOILS AND GEOLOGICAL EXPLORATION LOG Page 2 of 2 Boring No. **Project Name** Date Ended Geologist & Crew **BB-4** Date Started 11-091821 SR-905 4/8/2004 M Jandal 4/8/2004 Dist - Co. - Rte. - PM Purpose of work Location Top Hole Elev. **GDR** Investigation 11-SD-905 Ref Line E-5 Offset & Station 10 m Rt., 131+00 165 m **Drilling Equipment Drilling Method** Groundwater Level Truck Mounted Rig (CS 500) Wet core drilling Depth to Water Date Measured Lithological Descriptions Boring Depth (meter) 8. Plasticity 1. Group Name Total Hole Depth 7.60 m SPT Blows 9. Structure 2. Group Symbol Sample Number ab Work Assigned per.3 Depth (ft) 10. Cementation Total Recovery 3. Consistancy/Relative Density meter 11. Organics 4. Color CA Modified % Recovery 12. Fill Material 5. Moisture total 15 meter 13. Other 6. Partical Size & Shape Coring Boring [ ROD 7. Gradation SPT SPT GP/ Sandy Gravel/Clayey Sand, very dense, gray and brown, 41 refusal, 20 blows for 1" of penetration (Terrace Deposit) 27 21 20 22 - hit a solid layer, slow drilling 23 7 24 - refusal, 20 blows for 1" of penetration 25 End of boring at 7.6 meters 20 26 Ground water was not encountered during the drilling 8 operations. 28 29 9 30 31 32 33 10 34 35 36 11 37 38 9

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State of California - Department of Transportation - Office of Geotechnical Services SOILS AND GEOLOGICAL EXPLORATION LOG Page 2 of 2 Boring No. Geologist & Crew **Project Name Date Ended BB-6 Date Started** 11-091821 SR-905 A. Lari 4/7/2004 4/7/2004 Dist - Co. - Rte. - PM Purpose of work Location Top Hole Elev. 11-SD-905 **GDR** Investigation Ref Line E-5 Offset & Station: 10 m Rt. 134+00 160 m **Drilling Equipment Drilling Method** Groundwater Level Truck Mounted Rig (CS 500) Wet core drilling Depth to Water Date Measured Lithological Descriptions Boring Depth (meter) 8. Plasticity 1. Group Name Total Hole Depth SPT Blows 9. Structure 2. Group Symbol Boring Depth (ft) Sample Number Lab Work Assigned per.3 3. Consistancy/Relative Density 10. Cementation Total Recovery meter 11. Organics % Recovery CA Modified 12. Fill Material 5. Moisture 15 meter 13. Other Coring SPT tota 6. Partical Size & Shape ROD 7. Gradation SPT Poorly Graded Sand, very dense, dark gray (Terrace Deposit) SP 50+ 21 22 - hit rock, slow drilling 23 7 24 GW Well Graded gravel, very dense, dark gray, refusal, 30 blows 30 for 75 mm of penetration (Terrace Deposit) 25 26 8 End of boring at 8.2 meters 28 Ground water was not encountered during the drilling operations. 29 9 30 31 32 33 10 34 35 36 11 37 38 9

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